Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						7	3	6	2	/	0	1	Signature	

Paper Reference(s)

7362/01

London Examinations GCE

Pure Mathematics

Alternative Ordinary Level

Paper 1

Friday 19 January 2007 – Morning

Time: 2 hours

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

Materials required for examination
Nil

Items included with question papers
Nil

Candidates are expected to have an electronic calculator when answering this paper.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
You must write your answer for each question in the space following the question.

Information for Candidates

Full marks may be obtained for answers to ALL questions.
The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 10 questions in this question paper. The total mark for this paper is 100.
There are 28 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and legibly.

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1. Differentiate with respect to x, $(x+2)e^{3x}$.

Q1

(Total 3 marks)

Leave blank

2. (a) On the same axes, sketch the lines with equations $x = 6$, $y = 3x$ and $y = 15 - 2x$.

(3)

(b) Show, by shading, the region for which $x \leqslant 6$, $y \leqslant 3x$ and $y \geqslant 15 - 2x$.

(1)

Q2

(Total 4 marks)

Leave blank

3. Find the coordinates of the points of intersection of the curve with equation $y = 3x^2 - 4x + 2$ and the line with equation $7x + y = 8$.

Q3

(Total 5 marks)

Leave blank

4. Oil drips from a leaking pipe and forms a circular pool on horizontal ground. The area of the pool is increasing at a constant rate of 30 cm^2/s. Find, to 2 significant figures, the rate of increase of the radius when the area of the pool is 40 cm^2.

(Total 6 marks)

Q4

Leave blank

5. (a) Find, in terms of n, $\sum_{r=1}^{n}(7r-3)$.

(3)

(b) Hence, or otherwise, evaluate $\sum_{r=15}^{30}(7r-3)$.

(3)

Given that $\sum_{r=1}^{n}(7r-3)=1020$,

(c) find the value of n.

(3)

Leave blank

Question 5 continued

(Total 9 marks)

Q5

Leave blank

6. A particle P moves in a straight line such that at time t seconds its displacement, s metres, from a fixed point O on the line is given by

$$s = t^3 - 7t^2 + 10t, \quad t \geqslant 0.$$

(a) Find the values of t ($t > 0$) at which P passes through O.

(3)

(b) Find the **speed** of P each time it passes through O.

(4)

(c) Find the greatest **speed** of P in the interval $0 \leqslant t \leqslant 5$.

(5)

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Question 6 continued

(Total 12 marks)

Q6

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7.

Figure 1

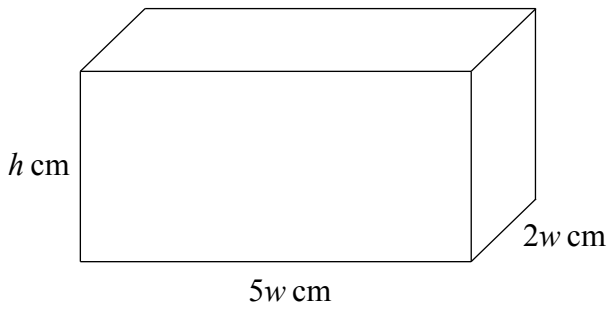

Figure 1 shows a closed rectangular box of height h cm. The width of the box is $2w$ cm and the length is $5w$ cm. The volume of the box is 540 cm^3 and the total external surface area of the box is A cm^2.

(a) Show that $A = 20w^2 + \frac{756}{w}$.

(4)

(b) Find, to 3 significant figures, the value of w for which $\frac{\mathrm{d}A}{\mathrm{d}w} = 0$.

(3)

(c) Prove that the value of w obtained in part (b) gives a minimum value for A.

(4)

(d) Find, to the nearest whole number, the minimum value of A.

(2)

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Q7

(Total 13 marks)

Leave blank

8. $$\cos(A + B) \equiv \cos A \cos B - \sin A \sin B.$$

$$\mathrm{f}(\theta) = 5\cos\theta - 12\sin\theta.$$

Given that $\mathrm{f}(\theta) = p\cos(\theta + \alpha)$, $p > 0$, $0 < \alpha < \frac{\pi}{2}$,

(a) (i) show that $p = 13$,

(ii) find, in radians to 3 significant figures, the value of α.

(5)

(b) Hence solve, to 2 significant figures, for $0 \leqslant \theta < 2\pi$, $5\cos\theta - 12\sin\theta = 9$.

(4)

(c) Evaluate $\int_0^{\frac{\pi}{3}} \mathrm{f}(\theta)\,\mathrm{d}\theta$, giving your answer in the form $c + d\sqrt{3}$, where c and d are rational numbers.

(5)

Leave blank

Question 8 continued

Leave blank

Question 8 continued

Leave blank

Question 8 continued

Q8

(Total 14 marks)

Leave blank

9. (a) Expand $(1+5x)^{\frac{1}{3}}$ in ascending powers of x up to and including the term in x^3, simplifying each term as far as possible.

(4)

(b) By substituting $x = \frac{1}{8}$ into your expansion, obtain an approximation, to 2 decimal places, for $\sqrt[3]{13}$.

(4)

(c) Calculate the percentage error, to 2 significant figures, in the approximation obtained in part (b).

(2)

Given that $\dfrac{(1+5x)^{\frac{1}{3}}}{(1+x)^4} \equiv a + bx + cx^2 + ...$

(d) find the exact values of a, b and c.

(6)

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Q9

(Total 16 marks)

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10. A curve has equation $y = \dfrac{5x^2 + 10}{2x - 1}$, $x \neq \frac{1}{2}$.

(a) Write down an equation of the asymptote to the curve which is parallel to the y-axis.

(1)

(b) Find the coordinates of the stationary points on the curve.

(6)

(c) Sketch the curve, showing the asymptote parallel to the y-axis and the coordinates of the stationary points.

(3)

The curve crosses the y-axis at the point A.

(d) Find an equation for the tangent to the curve at A.

(3)

(e) Find an equation for the normal to the curve at A.

(2)

(f) Find the area enclosed by the tangent at A, the normal at A and the x-axis.

(3)

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Question 10 continued

Leave blank

Question 10 continued

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Question 10 continued

Q10

(Total 18 marks)

TOTAL FOR PAPER: 100 MARKS

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